

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (currently amended) A steelmaking process that includes the steps of:

(a) producing molten steel and molten steelmaking process in a steelmaking vessel, the steelmaking slag including iron units and flux units; and

(b) producing molten iron in a direct smelting process in a direct smelting vessel containing a molten bath of iron and slag using a substantial portion of the steelmaking slag as part of the feed material requirements for the direct smelting process,

wherein the direct smelting process includes using a slag forming agent to provide flux units in addition to the flux units provided by the steelmaking slag, injecting the slag forming agent directly into the direct smelting vessel as opposed to pre-treating the slag forming agent before injection into the vessel as is the case with the steelmaking slag, and injecting solid feed materials through downwardly extending solids injection lances with sufficient momentum to penetrate the molten bath and to cause splashes, droplets, and streams of molten iron and slag to be projected above the surface of the molten bath.

2. (original) The process defined in claim 1 wherein step (b) includes using at least 70% by weight of the steelmaking slag as part of the feed material requirements for the direct smelting process.

3. (original) The process defined in claim 1 wherein step (b) includes using at least 80% by weight of the steelmaking slag as part of the feed material requirements for the direct smelting process.

4. (original) The process defined in claim 1 wherein step (b) includes using at least 90% by weight of the steelmaking slag as part of the feed material requirements for the direct smelting process.

5. (previously presented) The process defined in claim 1 wherein step (b) includes using sufficient steelmaking slag to provide at least 50% by weight of the flux units of the feed material requirements of the direct smelting process.

6. (previously presented) The process defined in claim 1 wherein the process is an integrated steelmaking process and includes producing molten iron in at least one ironmaking vessel and supplying the molten iron as a ferrous feed material for step (a).

7. (previously presented) The process defined in claim 1 includes using iron produced in step (b) as at least part of the ferrous feed material for producing steel in step (a).

8. (previously presented) The process defined in claim 1 includes using iron produced in step (b) and in at least one other ironmaking vessel as the ferrous feed material for producing steel in step (a).

9. (previously presented) The process defined in claim 1 wherein step (b) includes controlling the direct smelting process to smelt the ferrous feed material and substantially partition phosphorus to the slag.

10. (currently amended) The process defined in claim 1 wherein the direct smelting process is a ~~HSmelt process~~ molten bath-based process in which the solid feed materials are injected significantly deeper into the molten bath.

11. (previously presented) The process defined in claim 1 includes pre-treating ferrous feed material including steelmaking slag containing iron and flux units for step (b) by at least heating the ferrous feed material in a pre-treatment unit.

12. (currently amended) The process defined in claim ~~[[12]]~~11 wherein the pre-treatment step includes preheating the ferrous feed material to at least 400°C.

13. (original) The process defined in claim 12 wherein the pre-treatment step includes preheating the ferrous feed material to at least 700°C.

14. (previously presented) The process defined in claim 11 wherein the pre-treatment step includes preheating the ferrous feed material to a temperature less than 1050°C.

15. (previously presented) The process defined in claim 11 wherein the pre-treatment step includes preheating the ferrous feed material to a temperature less than 900°C.

16. (previously presented) The process defined in claim 11 wherein the pre-treatment step includes wet scrubbing an offgas produced in the step and using wet sludge containing steelmaking slag in the process.

Claims 17-18. (cancelled)

19. (currently amended) The process defined in claim [[18]]1 wherein the amount of the slag forming agent injected directly into the direct smelting vessel is sufficient to provide up to 30% by weight of the flux requirements.

20. (currently amended) The process defined in claim [[17]]1 wherein the ~~additional~~ slag forming agent includes calcium oxide.

21. (currently amended) The process defined in claim [[17]]1, ~~includes further~~ including cooling the steelmaking slag produced in step (a) prior to using at least a portion of the steelmaking slag in step (b).

22. (original) The process defined in claim 21 further includes reducing the size of the cooled steelmaking slag prior to adding the steelmaking slag in step (b).

Claim 23. (cancelled)

24. (currently amended) A direct smelting process for producing molten iron in a direct smelting vessel containing a molten bath of iron and slag, the process including the steps of:

(a) pre-treating ferrous feed material including steelmaking slag containing iron and flux units in a pre-treatment unit by at least heating the ferrous feed material; and

(b) direct smelting molten iron in a direct smelting vessel containing a molten bath of iron and slag using the pre-treated ferrous feed material including steelmaking slag from step (a) as part of the feed material requirements for the direct smelting vessel, using a slag forming agent to provide flux units in addition to flux units provide by the steelmaking slag, and injecting the slag forming agent directly into the direct smelting vessel as opposed to pre-treating the slag forming agent before injection into the vessel as is the case with the steelmaking slag.

25. (original) The process defined in claim 24 wherein step (a) includes heating and at least partially reducing the ferrous feed material.

26. (previously presented) The process defined in claim 24 wherein step (a) includes heating the ferrous feed material to at least 400°C.

27. (previously presented) The process defined in claim 24 wherein step (a) includes heating the ferrous feed material to at least 700°C.

28. (previously presented) The process defined in claim 24 wherein step (a) includes preheating the ferrous feed material to a temperature less than 1050°C.

29. (previously presented) The process defined in claim 24 wherein step (a) includes preheating the ferrous feed material to a temperature less than 900°C.

30. (previously presented) The process defined in claim 24 wherein step (a) includes wet scrubbing an offgas produced in the step and using wet sludge containing steelmaking slag in the process.

Claims 31-32. (cancelled)

33. (currently amended) The process defined in claim ~~[[31]]~~24 wherein the amount of the slag forming agent injected directly into the direct smelting vessel is sufficient to provide up to 30% by weight of the flux requirements.

34. (currently amended) The process defined in claim ~~[[31]]~~24 wherein the additional slag forming agent includes calcium oxide.

35. (previously presented) The process defined in claim 24 wherein step (b) includes controlling conditions within the direct smelting vessel to smelt the ferrous feed material to iron in the bath and to substantially partition phosphorus to the slag.

36. (previously presented) The process defined in claim 24 wherein step (b) includes controlling conditions within the direct smelting vessel to partition phosphorus to the slag by maintaining the slag in an oxidising condition whereby the partition ratio of phosphorus in the iron to phosphorus in the slag is at least 1:5.

37. (previously presented) The process defined in claim 24 wherein step (b) includes controlling conditions within the direct smelting vessel to partition phosphorus to the slag by maintaining the slag temperature to be in the range of 1350-1450°C and the amount of FeO in the slag to be at least 3% by weight.

38. (currently amended) A steelmaking process that includes the steps of:

(a) producing molten steel and molten steelmaking slag in a steelmaking process in a steelmaking vessel, the steelmaking slag including iron units and flux units; and

(b) producing molten iron in a direct smelting process in a direct smelting vessel containing a molten bath of iron and slag by supplying iron ore or pre-treated iron ore and carbonaceous material to the direct smelting vessel as a part of the feed material requirements of the direct smelting process and using a substantial portion of the steelmaking slag from step (a) as another part of the feed material requirements for the direct smelting process and smelting the iron ore or pre-treated iron ore and iron units to produce molten iron,

wherein step (b) includes using a slag forming agent to provide flux units in addition to the flux units provided by the steelmaking slag, injecting the slag forming

agent directly into the direct smelting vessel as opposed to pre-treating the slag forming agent before injection into the vessel as is the case with the steelmaking slag.

39. (new) A direct smelting process for producing molten iron in a direct smelting vessel containing a molten bath of iron and slag, the process including the steps of:

(a) pre-treating ferrous feed material including steelmaking slag containing iron and flux units in a pre-treatment unit by heating and at least partially reducing the ferrous feed material; and

(b) direct smelting molten iron in a direct smelting vessel containing a molten bath of iron and slag using the pre-treated ferrous feed material including steelmaking slag from step (a) as part of the feed material requirements for the direct smelting vessel.